REMARKS

I. INTRODUCTION

In response to the Office Action dated December 9, 2005, claim 19 has been amended. Claims 1, 4-6, 8-19, 21, and 23-31 remain in the application. Entry of this amendment, and reconsideration of the application, as amended, is requested.

II. REAL PARTY IN INTEREST

The real party in interest is Autodesk, Inc.

III. RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences for the above-referenced patent application.

IV. STATUS OF CLAIMS

Claims 1, 4-6, 8-19, 21, and 23-31 are pending.

Claims 2, 3, 7, 20, and 22 have been cancelled.

Claims 1, 4-6, 8, 12-14, 16-19, 21, 23, and 26-31 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Lim (5,638,126) in view of Linzer (6,038,256).

Claims 9-11, 15, and 24-25 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Lim, Linzer, and in view of Gonzales (5,231,484).

All of the above rejections are being appealed.

V. STATUS OF AMENDMENTS

There have been no amendments subsequent to the final Office Action.

VI. SUMMARY OF CLAIMED SUBJECT MATTER

Independent claims 1, 16, and 19 are generally directed to encoding data (see page 1, line 17). More specifically, a separate function for each frame in a sequence of frames is determined (see page 2, lines 4-8; page 6, lines 1-12). Each function relates encoding size to encoded quality for each frame in the sequence of frames (see page 6, lines 1-12).

Before encoding any frames in a sequence, a search of all of the separate functions is conducted to determine a best quality value for encoding the entire sequence (see page 6, lines 4-12). The encoded sequence satisfies various constraints (see page 6, lines 4-12).

Once the best quality value is determined (based on the search of the functions), each frame of the entire sequence is encoded with the same best quality value (see page 6, lines 13-14).

Once encoded, a determination is made regarding whether each encoded frame in the sequence satisfies the constraints (see page 6, lines 14-19).

If the encoded frames satisfy the constraints, the system merely transmits the already encoded sequence of frames (see page 6, lines 19-21).

However, as set forth in dependent claims 27, 28, and 30, if one or more encoded frames do not satisfy the constraints the process repeats by determining a new separate function that is based on the prior separate function determining and search (see page 6, lines 22-29). Thereafter, the search, encoding, and determining (whether the encoded frames satisfy the constraints) steps are repeated based on the new function (see page 6, lines 22-29).

VII. GROUNDS OF REJECTION TO BE REVIEWED

Claims 1, 4-6, 8, 12-14, 16-19, 21, 23, and 26-31 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Lim (5,638,126) in view of Linzer (6,038,256).

Claims 9-11, 15, and 24-25 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Lim, Linzer, and in view of Gonzales (5,231,484).

Applicants request review of all of these grounds of rejection.

VIII. ARGUMENT

In paragraphs (1)-(2) of the Office Action, claims 1, 4-6, 8, 12-14, 16-19, 21, 23, and 26-31 were rejected under 35 U.S.C. §103(a) as being unpatentable over Lim, U.S. Patent No. 5,638,126 (Lim) in view of Linzer, U.S. Patent No. 6,038,256 (Linzer). On page (10) of the Office Action, claims 9-11, 15, and 24-25 were rejected under 35 U.S.C. §103(a) as being unpatentable over Lim and Linzer in view of Gonzales, U.S. Patent No. 5,231,484 (Gonzales).

Specifically, the independent claims were rejected as follows:

> Regarding claims 1 and 19, Lim discloses a program storage media storing computer executable instructions, the instructions to cause a computer to:

determining a separate function for each frame in a sequence of frames, each function relating encoded size to encoded quality for each frame in a sequence of frames, each frame having data for an image (fig. 1, element 10 is the controller connected to the buffer 120 that receives various sizes or amounts of frame image data encoded by coder 110, where a sequence of frames is sent through the encoding system of fig. 1 in that since Lim's invention uses an MPEWG encoder for encoding a plurality of images, I, P and B frames, each frame within that sequence of frames (GOP) have different sizes, and further, note quantization controller 10, there is a selector 160 that decides which quantization parameter to use on the evaluated frame(s) in order to properly allocate the number of bits to the evaluated frame(s) for efficient coding);

performing a search of all of the separate functions to determine a best quality value for encoding the sequence of frames whose encoded sizes satisfy one or more constraints, the constraints being associated with one or more of a transmission line bandwidth, a receiver buffer size and a total size constraint (fig. 1, element 10 is the controller connected to the buffer 120 that receives various sizes or amounts of frame image data encoded by coder 110, where the process of generating the encoded data at an acceptable bit rate for transmission in that a recursive process is done to monitor the quality of the encoded bit frames by checking on the buffer fullness to determine the total size constraint, and note Qp adjuster 130 adjusts the quality of the encoded frames and element 160 selects the best quality value Qp, thus, best quality value is ascertained; see col.3, ln.47-53);

encode each frame of the entire sequence of frames with the determined best quality value (fig. 1, note Qp adjuster 130 adjusts the quality of the encoded frames and element 150 selects the best quality value Qp, and coder 110 utilizes the information from quantization parameter deciding block 10 for coding with the best quality value);

determine whether each encoded frame satisfies the constraints (fig. 1, note a recursive process is done to monitor the quality of the encoded bit frames by checking on the buffer fullness to determine the total size constraint to determine whether the frame satisfies the constraints); and

if the encoded frames satisfy the constraints, order transmission of frames of the sequence (fig. 1, note data from buffer 120 is transmitted to transmission for transmission of frames of the sequence of images).

Lim does not specifically disclose the prior to encoding any of the frames that performs a search of all frames in the sequence of frames for a best quality value. However, Linzer teaches that prior to encoding any of the frames, there is an execution of searching of all the frames prior to encoding any of the frames (fig.3, element 24 and col.5, ln.63-67 and col.6, ln.9-13 and ln.25-26, note the statistics gatherer 24 obtains a search of all frames from the video sources to obtain a best quality value prior to encoding any of the frames). Therefore, it would have been obvious to one of ordinary skill in the art to combine the teachings of Lim and Linzer, together as a whole, for gathering all of the possible pre-encoding data so as to efficiently encoding high quality images in an accurate, precise manner (Linzer col.3, ln.64 to col.4, ln.13).

Regarding claim 16, Lim discloses a system for encoding image frames, the system comprising:

a controller connected to receive data on sizes on image frames that are part of a sequence of image frames (fig. 1, element 10), to be encoded by the encoder and to control quality of the encoded frames produced by the encoder based on :

determination of a separate function for each image frame in the sequence of image frames, each function relating encoding size to encoded quality for each frame in the sequence of frames (fig.1, element 10 is the controller connected to the buffer 120 that receives various sizes or amounts of frame image data encoded by coder 110, where a sequence of frames is sent through the encoding system of fig.1 in that since Lim's invention uses an MPEG encoder for encoding a plurality of images, I, P and B frames, each frame within that sequence of frames (GOP) have different sizes, and further, note quantization controller 10, there is a selector 160 that decides which quantization parameter to use on the evaluated frame(s) in order to properly allocate that number of bits to the evaluated frame(s) for efficient coding);

a search of all of the separate functions to determine a best quality value for encoding the sequence of frames whose encoded sizes satisfy one or more constraints, the constraints being associated with one of a bandwidth of a transmission line, space in a receiver buffer and a total

compressed size (fig. 1, element 10 is the controller connected to the buffer 120 that receives various sizes or amounts of frame image data encoded by coder 100, where the process of generating the encoded data at an acceptable bit rate for transmission in that a recursive process is done to monitor the quality of the encoded bit frames by checking on the buffer fullness to determine the total size constraint, and note Qp adjuster 130 adjusts the quality of the encoded frames and element 160 selects the best quality value Qp, thus, best quality value is ascertained; see col.3, ln.47-53); and

a variable bit rate encoder controlled by the controller configured to encode each frame of the entire sequence of frames with the determined best quality value, wherein the controller is further configured to determine whether each encoded frame satisfies the constraints, and if the encoded frames satisfy the constraints, transmitting the sequence of encoded frames (fig., element 110 is the variable bit rate encoder controlled by the controller 10 connected to the buffer 120 that receives various sizes or amounts of frame image data encoded by coder 110, where the process of generating the encoded data at an acceptable bit rate for transmission in that a recursive process is done to monitor the quality of the encoded bit frames by checking on the buffer fullness to determine the total size constraint, and note Qp adjuster 130 adjusts the quality of the encoded frames and element 160 selects the best quality value Qp, thus, best quality value is ascertained; see col.3, ln.47-53).

Lim does not specifically disclose the *prior to encoding* any of the frames that performs a search of all frames in the sequence of frames for a best quality value. However, Linzer teaches that prior to encoding any of the frames, there is an execution of searching of all the frames prior to encoding any of the frames (fig.3, element 24 and col.5,ln.63-67 and col.6, ln.9-13 and ln.25-26, note the statistics gatherer 24 obtains a search of all the frames from the video sources to obtain a best quality value prior to encoding any of the frames). Therefore, it would have been obvious to one of ordinary skill in the art to combine the teachings of Lim and Linzer, together as a whole, for gathering all of the possible pre-encoding data so as to efficiently encoding high quality images in an accurate, precise manner (Linzer col.3, ln.64 to col.4, ln. 13).

Applicants traverse the above rejections for one or more of the following reasons:

(1) Neither Lim, Linzer, nor Gonzales teach, disclose or suggest a separate function, for each frame in a sequence of frames, that relates encoded size to encoded quality for each frame;

(2) Neither Lim, Linzer, nor Gonzales teach, disclose or suggest a search of all of the separate functions to determine a best quality value to encode the entire sequence;

(3) Neither Lim, Linzer, nor Gonzales teach, disclose or suggest encoding each frame using the same determined best quality for all of the frames; and

(4) Lim teaches away from searching all of the separate functions prior to encoding any of the frames.

The cited references do not teach nor suggest various elements of Applicants' independent claims.

In rejecting the function related aspects of the claims, the Office Action relied on Lim Fig. 1. Applicants note that in Lim, a video signal encoding apparatus is used to convert blocks into coefficients that are then processed by a quantization circuit. The quantization circuit (referred to as quantizer 100) merely receives a quantization parameter (Qp) that is used with a matrix of base quantization step sizes to determine what data should be output (see col. 3, lines 15-36). However,

the Qp used by the quantization circuit is determined via the quantization parameter deciding block 10 of Fig. 1. As described in Lim, such a deciding block 10 determines the Qp merely based on the fullness of the buffer (see col. 3, lines 47-53) and the particular slice of a frame that is currently being encoded (see col. 3, line 58- col. 4, line 20). In this regard, Lim describes a frame that is made up of multiple slices. Further, Lim indicates that the image characteristics of the first slice of a current frame are not much different from those of the second slice of a preceding frame. Accordingly, the end result that Lim produces is that a Qp for a second slice (of a preceding frame) is used as the Qp for the first slice of a current frame (see col. 4, lines 8-20). Again, the Qp is based on a buffer fullness (and the current slice being processed) and is processed with a matrix of base quantization steps to determine a particular size of quantized data to generate (see col. 3, lines 20-35). Further, Lim explicitly states that the Qp for other slices are NOT stored in memory 140 (see col. 3, lines 63-64).

However, contrary to the present claims, Lim does not even remotely describe a function for each frame in a sequence. Further, Lim does not teach, describe, suggest, allude to, or hint at a function that relates encoded size to encoded quality for each frame in a sequence. In addition, Lim does not perform a search of all such functions to determine a single best quality value that is used to encode all of the frames in a sequence. In this regard, the Office Action attempts to assert that the use of an MPEG encoder and a selector that decides which Qp to use, is equivalent to the functions determined in the present invention. Applicants respectfully disagree. The mere selection of a Qp does not and cannot teach, disclose, or suggest a function that is determined for each frame in a sequence. Nor does such a selection take into account that all of such functions are searched before encoding any of the frames. Accordingly, Lim fails to teach various aspects for which it has been asserted.

In response to some of the above previously submitted arguments, the final Office Action asserts:

> Regarding lines 2-3 on page 10 and lines 10-11 on page 11 of applicant's remarks, applicant asserts that neither Lim, Linzer nor Gonzales teach, disclose or suggest a separate function, for each frame in a sequence of frames, that related encoded size to encoded quality for each frame. The examiner respectfully disagrees. In fig. 1, Lim discloses the controller 10 is connected to the buffer 120 that receives various amounts of sizes of image frames encoded by coder 110, in that a sequence of frames is sent through the encoding system of fig. 1 in a recyclical or recursive manner that applies an MPEG video image encoding recursive rate control encoding scheme for encoding a plurality of images, I, P and B frames. Each frame within that sequence of frames (GOP) have different sizes. Further, Lim's fig. 1, there is a quantization controller 10 and a selector 160 that decides which quantization parameter to use on the evaluated frame(s) in order to properly allocate the number of

> bits to the evaluated frame(s) for efficient coding. Thus, Lim teaches a separate function, for each frame in a sequence of frames, that relates encoded size to encoded quality for each frame.

Applicants respectfully traverse and disagree with these assertions. Firstly, the Action states that the Lim's controller 10 is connected to the buffer 120. Applicants note that item 10 is the quantization parameter deciding block and is not the controller. To the contrary, controller is item 150. While the deciding block 10 is connected to the buffer 120, the controller 150 is not connected to the buffer 120. The buffer is receiving encoded video data that is generated by variable length encoding block 110 (see col. 3, lines 37-40). The Action then asserts that the use of a quantization controller 10 and a selector 10 that decides which quantization parameter to use on an evaluated frame in order to properly allocate the number of bits to the evaluated frame for efficient coding reads on a separate function for each frame in a sequence of frames. Such an assertion is wholly without merit.

Again, Lim is merely determining a Qp value to use to encode a particular slice of a frame. In this regard, a function for an entire frame among a sequence of frames is not determined. A complete function for a frame is never determined in any manner whatsoever. Thus, Lim is not determining a function whatsoever for an entire frame. Instead, a Qp is determined on a slice by slice basis without any consideration of the entire frame (as claimed).

Further, the Qp value and/or the recursive function of Lim completely fails to relate encoded size to encoded quality for each frame in a sequence. In this regard, Lim merely looks at the buffer fullness and the current slice that is being encoded. Thereafter, Lim determines which Qp to use based on the second preceding slice. Such an evaluation completely disregards the encoded size verses the encoded quality or the creation of any relationship whatsoever.

In addition it is noted that since Lim requires the value of the current slice that is being encoded in order to determine the Qp to utilize (see col. 3, line 47-col. 4, line 8), it is impossible to perform a search of the various functions prior to encoding any of the frames. Instead, Lim encodes each slice in real time dynamically while examining the buffer and the slice that is being encoded. By dynamically encoded such information, it is impossible to perform a search of all of the functions prior to encoding any frames. In this regard, Lim actually teaches away from the claimed methodology that teaches the performance of a search prior to encoding any of the frames.

In addition, Applicants note that Linzer also fails to cure the deficiencies of Lim. The Office Action relies on Linzer for the prior search aspects of the claims. Applicants respectfully traverse

such reliance on Linzer. Namely, as claimed, the search is conducted across the separate functions and not of the frames. Further, the search of the functions is used to determine a best quality value for encoding the entire sequence of frames in view of various constraints. Linzer teaches the gathering of statistics regarding video signals and that are indicative of the complexity of a signal that is generated before a bit allocation decision is made (see col. 5, lines 63-67; col. 6, lines 9-11). However, the mere existence of statistics does not teach the use or determination of a function that is based on such statistics. Again, the claims are directed towards determining a separate function for each frame in a sequence and not merely a collection of statistics regarding each frame. As claimed, the function relates encoded size to encoded quality. Further, the functions are searched to determine a best quality value. Linzer lacks any capability, suggestion, or motivation, to create a function or to search various functions to determine the best quality value for encoding all of the frames in a sequence.

In view of the above, Applicants submit that both Lim and Linzer clearly lack any description of a function, the determination of a function, or the searching of numerous functions as claimed. The other cited references also fail to cure the defects of Lim and Linzer.

In response to some of the above arguments, the final Office Action provides:

> Regarding lines 4-7 on page 10 and lines 11-14 on page 11 of applicant's remarks, applicant contends that neither Lim, Linzer nor Gonzales teach, disclose, or suggest a search of all of the separate functions to determine a best quality value to encode the entire sequence, and encoding each frame using the same determined best quality value for all of the frames. The examiner respectfully disagrees. In fig. 1, Lim discloses an MPEG video image encoding recursive rate control encoding scheme, as elaborated in the above arguments. Note the buffer 110 is image data storage that can store images of various sizes in that a recursive process is done to monitor the quality of the encoded bit frames by checking on the buffer fullness to determine the total size constraint. The Qp adjuster 130 of Lim's fig. 1 adjusts the quality of the encoded frames and element 160 selects the best quality value Qp out of a plurality of quality values obtained by functions performed by Qp adjuster and evaluation of the multitudes of degrees of buffer fullness. Thus, best quality value is ascertained and searched, as disclosed in col. 3, ln. 47-63. Therefore, Lim discloses a search of all of the separate functions to determine a best quality value to encode the entire sequence, and encoding each frame using the same determined best quality value for all of the frames.

Applicants respectfully traverse and disagree with such an assertion. As stated above, Lim merely looks to the buffer fullness and the Qp value of a second preceding frame to determine a Qp value to use when encoding the current frame. Such a teaching does not and cannot teach a search of numerous functions that all relate encoded size to encoded quality and determining a best quality

value for all of the frames based on the search of all of the separate functions. Again, merely adjusting a Qp value based on 2 factors does not teach a function or a search of a function.

The final Action asserts that Lim teaches a plurality of quality values obtained by functions performed by Qp adjuster and evaluation of the multitudes of degrees of buffer fullness. Such an assertion is without merit. Contrary to that asserted, the Qp adjuster does not perform functions to obtain a plurality of quality values. Further, the Qp adjuster also fails to evaluate a multitude of degrees of buffer fullness. Instead, the Qp adjuster merely determines a Qp based on buffer fullness (see col. 3, lines 47-53). Such a determination does not evaluate a multitude of degrees of buffer fullness. In fact, an electronic search of Lim for the term "multitude" provides no results whatsoever. Thus, the assertion in the final Office Action is not based on any teaching of Lim, explicitly or implicitly. In addition, "functions" are not performed by the Qp adjuster. Again, Lim clearly states that the Qp adjuster merely determines the degree of fullness of the buffer and determines the Qp accordingly (see col. 3, lines 47-53). Such a description fails to teach, disclose, and suggest separate functions for each frame in a sequence and searching the entire sequence.

In addition, it is noted that the claims provide that the single determined best quality value is used to encode each frame of the entire sequence of frames. Lim clearly teaches away from such an encoding since each slice uses a separate Qp that is based on buffer fullness and the preceding second slice. Thus, contrary to that asserted in the final Office Action, Lim does not teach encoding each frame of the entire sequence of frames with the determined best quality value (as claimed).

The final Office Action then continues:

> Linzer is used to teach *prior to encoding* any of the frames that performs a search of all frames in the sequence of frames for a best quality value, as disclosed in Linzer's fig. 3, element 24. Also, see col.5, ln.63-67, col. 6, ln.9-13 and ln.25-26, where the statistics gatherer 24 obtains a search of all the frames from the video sources to obtain a best quality value prior to encoding any of the frames. Therefore, it would have been obvious to one of ordinary skill in the art to combine the teachings of Lim and Linzer, together as a whole, for gathering all of the possible pre-encoding data so as to

efficiently encoding high quality images in an accurate, precise manner, as suggested in Linzer's column 3, line 64 to column 4, line 13.

Regarding lines 2-4 on page 12 of applicant's remarks, applicant states that there is no motivation in Linzer to combine with Lim. The examiner respectfully disagrees. In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See in re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and In re Jones, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, it would have been obvious to one of ordinary skill in the art to combine the teachings of Lim and Linzer, together as a whole, for gathering all of the possible pre-encoding data so as to efficiently encoding high quality images in an accurate, precise manner, as suggested in Linzer's column 3, line 64 to column 4, line 13.

Firstly, as stated above, Lim teaches away from searching all of the functions prior to encoding any of the frames. Thus, even if Linzer does teach such an aspect (which applicants traverse), Linzer can not be combined with Lim because of the teaching away aspects. Secondly, the final Office Action explicitly provides that Linzer teaches a search of all of the frames. As stated above, the claims do not provide for searching frames. Instead, the claims provide for searching separate functions for each frame. In this regard, a search of functions is not even remotely equivalent to searching the actual frames. Thus, Linzer completely fails to teach the limitations expressly set forth in the claims.

With respect to the motivation to combine – Applicants again assert that Lim actually teaches away from any combination with Lim as stated above. Further, even if they are combined, the combined teaching would clearly fail to teach the invention since both Lim and Linzer fail to describe the numerous functions, functions that relate encoded size to encoded quality for each frame, a search of such separate functions, and the encoding of all of the frames of an entire sequence of frames based on a best quality value determined from the search of all of the functions. Such claim elements are unique and non-obvious in view of all of the cited references.

Moreover, the various elements of Applicants' claimed invention together provide operational advantages over Lim, Linzer, and Gonzales. In addition, Applicants' invention solves problems not recognized by Lim, Linzer, and Gonzales.

Thus, Applicants submit that independent claims 1, 16, and 19 are allowable over Lim, Linzer, and Gonzales. Further, dependent claims 4-6, 8-15, 17-18, 21, and 23-31 are submitted to be allowable over Lim, Linzer, and Gonzales in the same manner, because they are dependent on independent claims 1, 16, and 19, respectively, and thus contain all the limitations of the

independent claims. In addition, dependent claims 4-6, 8-15, 17-18, 21, and 23-31 recite additional novel elements not shown by Lim, Linzer, and Gonzales.

IX. CONCLUSION

In view of the above, it is submitted that this application is now in good order for allowance and such allowance is respectfully solicited. Should the Examiner believe minor matters still remain that can be resolved in a telephone interview, the Examiner is urged to call Applicants' undersigned attorney.

Respectfully submitted,

Clinton A. Staley et al.

By their attorneys,

GATES & COOPER LLP

Howard Hughes Center
6701 Center Drive West, Suite 1050
Los Angeles, California 90045
(310) 641-8797

Date: February 9, 2006

By: Jason S. Feldmar
Name: Jason S. Feldmar
Reg. No.: 39,187